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dancers, contortionists, etc., prove of what a variety of motions man is capable.

Man possesses, in addition, organs of assimilation such as no animal enjoys, owing to the structure of his teeth, the alimentary canal, etc. Indeed, there is no animal in which all the three species of teeth are found in such an uninterrupted proportion as in man. The possibility of the distribution of mankind on all parts of the globe is owing to the pliability of man's organization. But few animals can support, like man, the differences in climate, etc. It is also remarkable that the creatures approaching nearest to man, namely, the orangs and chimpanzes, are so far behind man in this respect, that they soon perish when removed from their native spot.

NOTES ON THE ANTIQUITY OF MAN.

WHEN did man make his first appearance on our globe?

Was man a witness of the last change in the surface of the earth, and of the inundations by which the gravel called diluvium has been deposited? And, if so, must he not have been the contemporary of many of the extinct gigantic animals?

No one doubts that the physical condition of the globe we inhabit, and the history of mankind, are legitimate subjects of human inquiry; and yet frequently where these questions have been raised there has been a great repugnance to discuss them on their own merits, from a vague fear that the facts elicited would clash against popular opinion.

The evidence in favour of a much greater antiquity of the human race than was hitherto allowed has been gradually accumulating. The facts which are everywhere brought to light, though perhaps not as yet universally acknowledged, are sufficiently pregnant, and the deductions from them too important to be any longer ignored; they must be thoroughly sifted, and either affirmed, or, if possible, refuted.

The present paper is a summary of the leading facts and opinions under discussion.

There is a circumstance connected with our subject which appears rather curious. While individuals or families are most anxious to trace their pedigree as far back as possible, and take pride in the antiquity of their descent, and while nations are equally tenacious of their remote antiquity, humanity, in the aggregate, prefers, in relation

to the existence of the rest of animals, to be considered as a modern creation, not dating further back than sixty centuries.

An intense egotism may, perhaps, be at the bottom of this apparent paradox. Man, in his pride, is so much in the habit of considering himself as the last link, as the epitome of the vegetable and animal world, in short as the lord of the creation, that he conceives it beneath his dignity to appear upon the scene until every thing had been duly prepared for his reception.

Chronological Data.—The Book of Genesis has formed the basis of our common chronology on the assumption that it gives the true epoch of the creation of the world and of man; yet the biblical texts differ. Thus, according to the Alexandrian version, 2,262 years are reckoned from the Creation to the Deluge. The Hebrew account has 1,656, and the Samaritan text 1,307 years.

Hence chronological computators greatly differ, and Desvignoles (*Chronology of Sacred History*), has collected above two hundred different calculations, varying from 3,483, the shortest, to 6,984, the longest period said to have elapsed between the Creation of the world and the commencement of our present era, so that the difference amounts to above 3,000 years.

That the Hebrew chronology falls infinitely short in reference to the creation of our globe is almost universally admitted even by those who contend for the consistency of Geology with Sacred History; hence the six days of creation are by many of these reconcilers considered as periods of time of indefinite length.

Hindoo Chronology.—According to the Indian mythology the world is to last four ages (yugs), three of which have already passed. The last, or the kali-yuga, commenced, according to Lepsius, in April 1302 B.C.

Conarda, a Cashmerian king, is supposed to have reigned 2448 B.C., and the era of king Vicramadyta is fixed at 58 B.C.

The pundits, by extending the Chaldean astrological cycle, make it 4,320,000 years.

Chaldean Chronology.—The 36 decans of the zodiac multiplied by the 12 months of the year yielded the mystic number 432. The grand year of astronomy, or the time supposed by the Chaldeans to be required for the sun, fixed stars, etc., to return to the same celestial starting point, was first 25,000, then 36,000, and at last 432,000 years, agreeing with the supposed duration of ten Græco-Chaldean generations. The deluge terminated the cycle.

Chinese Chronology.—Like the early history of every ancient people the Chinese possess also their fabulous and semi-historical periods.

Ante-historical periods (Chine Panthier).

Pankon, the first symbolical man, followed by the three Hoangs. 1st, reign of the sky; 2nd, reign of the earth; 3rd, reign of man. They are comprehended in a grand cyclic period of 129,000 years, composed of twelve parts, called conjunctions, each of 10,800 years. Semi-historical period commences with Fou-pi, first emperor, about 3,468 B.C. Several of his descendants are named who have made discoveries in arts.

The historical period commences with the first king Hoang-ti, about 2637 B.C., falling, according to Lepsius' computation, during the pyramidal period of Egypt. It is certain that art and science flourished in China at a remote period, and the Chinese possessed a high degree of civilization while the Hebrews led yet, under the patriarchs, a nomadic life.

Egyptian Chronology.—Manetho, the Egyptian priest's system of chronology, according to recent investigations, chiefly of Lepsius, is as follows:—

Cyclic periods anterior to Menes.

Divine dynasties—19 gods reigned	13,870 Julian years.
30 demigods	3,650

	17,520
Ante-historical dynasties	- 320

20,840 years.

Advent of Menes, the first king, commencement of historical period, 30 dynasties, 3893 B.C.

Lesueur places the beginning of the Egyptian kingdom 5773 B.C., while Bunsen assumes the 3,643 B.C. In either case, the history of Egypt reaches further back than that of any other nation. Brugsh is said to have brought from Egypt an old manuscript upon leather 4000 years old. How many thousand years have passed before the Egyptians could have become a mighty nation, and have acquired by mere self-tuition—for we have no record that they have learned anything from any other nation—the arts and sciences requisite for the conception and execution of the stupendous monuments and works of art still extant, cannot be determined.

Menes, of the ancient city of This, built the capital Memphis, between the Nile and the Lybian desert. But before Memphis was built there existed already the important cities of Thebes and This.

Language.—Much stronger than the evidence obtained from the chronology of different nations is that derived from the evolution, progress, and development of human language. Whatever view we adopt, it amounts almost to a physical impossibility that a grammatically constructed language should have issued from the mouth of the primitive man. For a very long period language was only transmitted from generation to generation by tradition, and an immense time must have elapsed before the living and dead languages, which are proved to have originated from a common stock, could have acquired a substantive form.

Bunsen, who, with many others, assumes one primitive language, observes,—

“Philosophical inquiry shows the monosyllabic or particle language, as preserved in the ancient Chinese, must be supposed, theoretically, to have preceded the organic language, and either each language separately must once have been like the Chinese, or the Chinese itself is the wreck of that primitive idiom from which all organic languages have physically descended.”

Arguing from such premises, Bunsen considers that, both from tradition and facts, the age of mankind cannot be less than 20,000 years, reckoning 10,000 years from Adam to Noah, and 10,000 years from Noah to the present era.

The question then arises, granting that the Chinese presents the primitive form does it present the primitive idiom? May it not, and has it not, been preceded by languages far more simple in form, and, if so, must not a long period have necessarily elapsed before it arrived at its present systematic form?

Again, assuming that the cradle of humanity was in a confined spot in the east, and that all the nations inhabiting the earth have proceeded from the same protoplasts, how many thousands of years have they required to spread upon the surface of the globe? Have not the first navigators found human beings every where? And again, what an immense period must have elapsed before the typical forms of the various races, supposing them to be the result of external influences, can have acquired that high degree of firmness and permanent development by which they are distinguished.

The naturally slow progress of civilization among primitive people deprived of experience to guide their steps, and forced, as it were, to grope in the dark, like a blind man, and to feel their ground, render the calculation to fix the age of mankind nearly impossible.

It belongs to Egyptologists and chronologists to separate the fabu-

lous from the probability of these computations, they are adduced merely as collateral arguments, which may be taken for what they are worth.

Neither shall we dwell upon the argument that the fragment of pottery found by Mr. Horner at a depth of thirty-nine feet from the surface of the ground, consisting of true Nile sediment, must be held as a record of the existence of man 13,371 years before A.D., reckoning the rate of increase in that locality at three inches and a half in a century.

This much, however, is undoubted, that according to the earliest record the Egyptians possessed a degree of civilization superior even to that of many subsequent centuries, a result which is certainly not compatible with the short time said to have elapsed between the Deluge and the time of the Pharaohs. This applies also to the early civilization of the Chinese, the Assyrians, and the Hindoos.

These perplexing considerations have not escaped the attention of devout believers in scripture authority. They have therefore been hard at work to reconcile the apparent conflict between sacred history and profane facts. Thus, among other theories, has been engendered the *Præ-Adamite* hypothesis, which is too curious to be omitted, and from which it will be observed that the Antediluvian theory is by no means a modern conceit.

In 1655 Izaak Peregre, a Calvinist scholar of Bordeaux, published a work entitled *Præ-Adamite*, in which he endeavours to prove, from certain passages in Genesis and the Epistles of St. Paul, that Adam and Eve were not the first human beings upon the earth. That there were in fact two separate creations of man, the first of which took place on the sixth day, along with the beasts of the earth, and in the same mode, namely, by the Creator merely bidding the earth to produce them. This he contends was the origin of the Gentiles, who spread upon the whole globe and peopled the earth. He further observes that the people of the new-world could not have been the descendants of Adam, separated as the new continent was from the old, they were obviously the descendants of the *Præ-Adamites*.

A long time, that is to say many thousand years after the first creation, God created Adam and Eve, but in a different manner; for God made man himself of the dust of the earth, and breathed into his nostrils the breath of life, and man became a living soul. In the first creation man and woman were created at once; in the second, woman was made out of the rib of man. In the second creation the persons are named, no special names are given in the first creation. From several other passages, specially from some verses from Paul's Epistles

to the Romans, as well as from the chronology of the Egyptians, Hindoos, etc., he arrives at the conclusion that human beings had existed long before Adam was created.

Peyrere's theory met with much opposition. The Paris Parliament caused his work to be publicly burned. The Inquisition took hold of him and forced him to abjure both his Præ-Adamite heresy and his Calvinism. He died in a convent in 1676.

There is no doubt that poor Peyrere was much in advance of his times, and therefore fair game for persecution. That this spirit is not quite extinct among us is proved by the fact that an estimable author, who recently published a similar work under the title of *Genesis of the Earth and of Man*, has not ventured to affix his name to his book. This writer also contends that the Scriptures afford abundant evidence in favour of the existence of Præ-Adamites, and that physical, historical, and linguistic facts confirm this view. It is, however, not a little singular that though this author travels pretty nearly over the same ground as Peyrere, and even quotes some of the same passages, Peyrere's name is never mentioned. One thing seems certain, that science can never be advanced by reconciliation theories.

Leaving now the fields of speculation and religious belief, we must try whether the antiquity of man may not be legitimately deduced from actual phenomena. The records of the living world lie after all in the hidden crust of the earth, every stratum is a page in the book of nature, and tells its own tale of the extinct species of plants and animals. To Geology, then, we must chiefly look for a key to solve approximatively the enigma, so that facts may support or displace theory, and knowledge may be substituted for mere speculation and belief.

Discovery of Fossil Quadrumana.—The great Cuvier, as is well known, was not only of opinion that the date of man's advent upon the globe did not much exceed the common computation of 6,000 years, but that the creation of the simian tribes, so nearly resembling the human organization, was either coetaneous, or but little anterior to that of man. Hence his dictum that human fossils did not exist, and his disbelief that fossil bones of quadrumana would be found. Cuvier's name was a tower of strength, and the circumstance that up to his death no bones of quadrumanous animals had been found in a fossil state seemed to confirm his opinion, and was generally considered as a fundamental fact.

The grass, however, had not long grown on the grave of Cuvier, when his own countryman, Ed. Lartet, discovered in 1836, at Sansan,

in the South of France, in fresh-water strata of the miocene tertiary period, a fossil monkey of the tailless or Gibbon tribe (*Pliopithecus antiquus*). Mr. Lartet, moreover, very recently communicated to the French Academy the finding of a new species of anthropoid monkey by M. Fontan, exhumed from a bank of marley clay at Saint Gaudens (Haute Garonne). The new fossil monkey appears to have surpassed in height living adult chimpanzees. M. Lartet proposed to call it *Dryopithecus Fontani* (Fontani's tree-monkey), as, like the Gibbon, it appears to have chiefly lived on trees. Later evidences, possibly referable to the same species, have been found at Eppelsheim, in Germany.

It is not a little curious that discoveries in one direction, when once made, either succeed each other rapidly, or are even made simultaneously. About the same time as Lartet discovered his fossil monkey in France, quadrumanous fossils were discovered in India by Messrs. Baker and Drummond in the lower range of the Himalayan mountains, where subsequently other fossils of the same kind were found and described by Dr. Falconer and Captain Cautley. They were found in the tertiary strata of conglomerate sand, marl, and clay. In Brazil Dr. Lund discovered, in 1837, similar fossils peculiar to America, and of a species now extinct. A fossil monkey, called by Professor Owen *Macacus Pliocenus*, from the stratum in which it was embedded, was found, in 1845, on the banks of the Thames at Gray's, in Essex.

A great breach having thus been effected in the master's theory, rendering the discovery of human fossils, at all events, less improbable, Cuvier's adherents became seriously alarmed, and a determined stand was and is still being made against anything presented in the shape of a human fossil.

We shall now endeavour to give a short *resumé* of the evidence as far as it goes in favour of the existence of human fossils, far from pretending that the evidence is sufficiently satisfactory to enable us to pronounce a decided judgment.

Fossil Man.—The belief in the existence of giants, founded as it was on the Scripture text, "There were giants on the earth in those days," (*Genesis* vi, 4), was formerly universal, and the finding of fossil bones of gigantic animals was well calculated to sustain that belief.

Thus we read that in 1577 a tremendous storm passed over the convent Reyden, near Lucerne; large oaks were torn up by the roots, and heaps of bones were found, which Dr. Plater, of Basle, declared to be the bones of an antediluvian giant nineteen feet high.

These bones are yet preserved in the Museum of Lucerne, and no person doubted at the time that they were the bones of a giant.

In 1613 a French surgeon, Mazurier, pretended to have found near Chaumont, in the South of France, a brick sepulchre bearing the inscription, *Teutobochus Rex*. This celebrated Teutonic king was defeated and taken prisoner by Marius at the great battle of Aquæ Sextiæ (Aix). The Romans say of him that his head was seen above the standards, and that he was so agile that he could leap over six horses. Taken prisoner about 102 B.C., he slumbered peacefully for seventeen centuries, when he rose again as the king of fossil giants. The skeleton is described as having been twenty-five and a half feet in length, breadth of the chest ten feet, with a skull five feet in diameter. These bones are now recognized to have belonged to the Mastodon Angustidens.

Nor must we wonder at the credulity then prevalent, when we recollect that comparative anatomy was at that time almost an unknown science, so that even the great Leibnitz formed, in 1663, of the mammoth bones found by Otto Guericke, the inventor of the air-pump, a biped skeleton with a large horn upon the forehead which he called the fossil unicorn (*Unicornu fossile*).

But the most celebrated of all alleged human fossils was that found by Professor Scheuchzer, of Zurich, in 1726, in a stone quarry of Eningen. This was the famous "Homo diluvii testis." Scheuchzer says of it, "There may still be seen in this rare relic of the accursed race of the primitive world, the circumference of the frontal bone, the orbits of the eye, the ethmoid bone, a portion of the nose, sixteen vertebræ, the first rib covered with petrified skin, and some vestiges of the liver," and he exclaims :

"Melancholy skeleton of an old sinner,
Convert the hearts of modern reprobates."

There is, however, one thing which perplexes Scheuchzer. What has become of the occiput? Either, he explains, the quarrymen of Eningen have broken it off, or, *carcharus quidam*, some dog-fish, has, with its sharp teeth, bitten it right off in the deluge.

It is now known that Scheuchzer's fossil is the remains of a gigantic salamander, which in honour of the discoverer has been termed *Andrias Scheuchzeri*. A small living specimen of an allied species, the *Cryptobranchus Japonica*, is now in the gardens of the Zoological Society. The round mouth of the fossil animal appeared to the Zurich professor to be the remains of a human forehead.

The imagined existence of antediluvian giants and fossil man was thus seemingly disposed of by the progress of comparative anatomy. But an idea once engendered in the human brain bears a charmed life, and though it may remain dormant for a long period, a revival is sure to take place; and thus we find the question of the fossil man is now more agitated than ever.

The term fossil is at present used synonymously with organic remains, though it is well known that in many fossils all organic matter has disappeared and been replaced by mineral substances.

The usual test applied to judge of the age of bones consists in observing the relative proportion of animal and vegetable matter present; if a certain proportion of animal matter be still present, the bone will neither be brittle, nor will it adhere to the tongue and lips; but if the animal matter has disappeared, and nothing but earthy matter remains, the bone will be both brittle and adhesive. Again, by placing the bone into dilute hydro-chloric acid, the recent bone retains, after the removal of the earthy matter, its form in a flexible state, while the true fossil bone will, similarly treated, be reduced to a spongy mass, and dissolve with effervescence.

This is still considered an *experimentum crucis* in relation to the age of organic remains. But is the test infallible and decisive? It appears not.

It is now ascertained that bones of recent animals, introduced into old deposits, may assume, in a comparatively short time, the condition of the bones of extinct animals, while, on the other hand, undoubted fossil bones of extinct animals may, under certain conditions, present a large proportion of animal matter.

Thus we read (Meigs' *Description of a Deformed Skull*, 1859), that a piece of an ancient Burgundian skull, and a fragment of the skull of an ancient Roman, found in a tomb between Cumæ and the ruins of Baiæ, after being subjected to an analytical process, were found to consist almost wholly of earthy matter. The animal matter had almost entirely disappeared. These bones were dissolved in a much less time than the piece from a deformed Jerusalem skull, and their solution gave rise to a very active formation and escape of gas.

The Museum of the Academy of Natural History of Philadelphia, is stated to contain bones of the Megalonyx and the extinct Peccary, remaining until this day nearly unchanged. It is asserted that very little of the gelatine has been lost, nor a particle of mineral matter added; it is even stated that some portions of articular cartilage and tendinous attachments are well preserved.

Many of the human bones found by Mr. Lund in the ossiferous

caves of Brazil were petrified in the same manner, offering the same metallic break, and penetrated by the same ferruginous incrustations as the bones of the extinct animals with which they were found associated.

The human bones found by M. de Christol in the caverns at Pondres (Departement Herault), contained as little animal matter as those of the hyænas and other extinct animals with which they were mingled; they were equally brittle, and as little adhesive. The test then is, after all, only a presumptive and by no means a decisive one.

M. Pictet* has thus expressed himself respecting the question of Fossil Man:—

“The question may be put thus, at what period has man appeared upon the earth? What was the geological state of the surface of the earth? What animals lived at that period?

“A precise answer to these questions would be all that could be desired. We have not yet arrived at that point, though it seems we are nearer to it than we were some years ago.

“When the earth was sufficiently cooled down vegetation began to cover the emerged continents. After which the first zoological creation took place, and animals, differing from such as now exist, spread over the earth.

“Elevations and depressions modified the surface of the earth, and be it by the direct action of these phenomena, or by the organic laws which govern the world, and which we do not yet perfectly comprehend, the beings then living disappeared to be replaced by others. These phenomena, or something like them, occurred repeatedly, and thus numerous populations succeeded each other. Each of these has left its remains in strata, formed at different periods, and these remains are the ‘medals of the creation,’ which, with data furnished by geology, enable us to reconstitute the history of the globe. The existence of at least thirty epochs, more or less distinct, are recognized, each of which possessing a special Fauna.

“The imagination is unable to calculate the number of years or eras requisite for the succession of these phenomena, in which all these populations were developed by successive generations.

“As regards the history of man we need not occupy ourselves with these remote periods, we may take as a starting point the formation of the deposits of the tertiary period. These deposits, known by the name pliocene, are the last produced before the period when appeared

* Pictet, *Biblioth. Univ. de Genève*, 1860.

for the first time the actual animal population. They contain the remains of species very similar to such now existing, belonging to the same genera though specifically distinct.

On the termination of the tertiary period, commences the period known by the name of *diluvian* or *quaternary*, which may be considered as the commencement of the actual period, when there existed a group of animals composed in part of existing species, or of such which are now extinct. The more this period is studied the more do we learn that the existing species, considered from a zoological point, date thence their origin, and that since that period there has been no violent but only gradual and, probably, successive extinction of certain remarkable species.

"These gradual extinctions do not admit of any precise chronology as we do not know when the last representative of each species lived. Have the ancient populations existed during the depositions of the lowest diluvian gravel? Have they seen the cave bear, the mammoth, etc.? Or did man only appear when the globe had entered into its actual condition?

"The answer to these questions has varied with time.

"We cannot dissimulate from ourselves that there exists a repugnance to accept the facts relating to the antiquity of man, and that a sort of relief is felt when the facts are contradicted.

"To us, in viewing the question from a palæontological point of view, the antiquity of the races of man is, to say the least, all but certain.

"The animals of the actual world certainly date their origin from the commencement of the diluvian period. There was then a creative force which interrupted, to a certain extent, the natural succession of beings. Is it not more rational to place the appearance of man at this period than to assume a new interruption in a relatively tranquil period, when the condition of the globe much resembled the present? We may also urge another consideration which has never been pressed, which may, nevertheless, possess a degree of reality.

"The presence of man in the diluvian period may, perhaps, explain the extinction of certain species. It, indeed, is remarkable that races of small dimensions, and, so to say, unperceived, have continued, such as small carnivorous animals, rodentia, bats, reptiles, etc., whilst the larger species have disappeared. There seems to us to be no sufficient reason that either inundations or climate should have destroyed them more than other animals. May not man have had some part in their destruction; and is it so improbable to believe that

either for his use or his security he destroyed the stag, the bear, the hyena, and even the mammoth? We do not insist upon these considerations, which are nothing but theoretical, but we could not omit stating them, in order to favourably predispose the reader to accept without preconceived opinions the facts we are about to state.

“It may be said that such imperfect specimens of human industry are insufficient to prove the existence of ancient races. Why is there no pottery, no bones found? It is difficult to give a direct reply. Perhaps the pottery or the bones have not resisted the action of the gravels with which they were rolled about. At any rate, if the hatchets bear really the traces of human workmanship are they not sufficient to prove man’s existence?

“Such are the facts observed in 1859, all of which seem to agree to trace the origin of man up to the diluvian period.

“We terminate this article with a few observations on the volcanos of Auvergne, which appear to us to furnish, in relation to the history of man, some documents to which, in our opinion, too little importance has been attached. In 1844 M. Agmard, a distinguished palæontologist, announced the discovery of two human skeletons in the volcanic breccia of the volcano of Denise, near Puy-en-Velay. These volcanos of Auvergne became extinct in the remotest antiquity, and the breccia which encases these bones is not even derived from one of the last eruptions. We may add that on the opposite side of the mountain beds of tufa, apparently contemporaneous with those in which human bones have been found, are certain remains of the diluvian fauna, specially of the mammoth. These facts seem to indicate that man has lived in Auvergne at a remote period, when the volcanos were in a state of activity, and the extinct diluvian fauna still existed.

“This discovery was much contested. In the first place, the authenticity of the pieces enclosing the bones was denied; they went so far as to say that they were fabricated. We believe that at present all doubts on the point are removed. There remains, however, yet a difficulty. The rock where these human fossils have been found consists of two portions, the one compact, in which no bones have yet been found, the other light and porous, which alone contains these remains. It is not impossible that the porous rock may have been disturbed, that is, formed by crushed *débris* previously detached and again united, in which case they would belong to a more recent period. This hypothesis deserves to be examined.

“We earnestly call for a complete study of this subject, free from

any preconceived theories, to prove the great antiquity of the human species, and thus to contribute so important a page in the history of man."

Human Fossils in America.—Dr. Lund, the Danish naturalist, has given an account of his discoveries in the caves of Brazil, so rich in animal remains. He found human fossils in eight different localities, all bearing marks of geological antiquity, intermixed with those of numerous extinct animals. In the province of Minas Geraes he found human skeletons among the remains of forty-four species of extinct animals, among which was a fossil horse. In a cave on the borders of a lake called Loago Santa, he again collected multifarious human bones in the same condition as those of other extinct animals, and he considers that their geological relations unite to prove that they were entombed in their present position long before the formation of the lake on whose borders the cavern is situated, leaving thus no doubt of their coexistence in life, and their association in death. With regard to the race to which the human fossils belonged, Dr. Lund observes that the form of the cranium differed in no respect from the acknowledged American type. From these facts the American authorities conclude, not only that man was contemporaneous with the extinct animals, but that the aboriginal man in America antedates the Mississippi alluvia.

Professor Agassiz in his lectures, delivered at Mobile, 1853, says: * "Respecting the fossil remains of the human body I possess from Florida, I can only state, that the identity with human bones is beyond question; the parts preserved being the jaws with perfect teeth, and a portion of a foot. They were discovered by my friend Pourtales in a bluff upon the shores of lake Monroe, in Florida. The mass in which they were found is a conglomerate of rotten coral-reef, limestone, and shells.

"The question of their age is more difficult to settle. Considering that the marine animals now living along the coast of Florida have, at least, been in existence one hundred thousand years, for their remains are found in the coral, limestone, and upon the outside reefs, and assuming that the surface of the northern half of the peninsular already formed continued for nine-tenths of that time a desert waste, there would still remain ten thousand years during which it should be admitted that the mainland was inhabited by man and the land animals, vestiges of which have been buried in the deposits formed by the fresh waters covering parts of its surface."

* *Types of Mankind.*

In the Proceedings of the Academy of Natural Sciences, Philadelphia (1846), it was stated that Dr. Dickeson presented a relic of great interest, viz., the fossil *os innominatum* of a human subject taken from a stratum of blue clay, near Natchez, Mississippi, and about two feet below the skeletons of the *Megalonyx* and other genera of extinct quadrupeds. Sir Chas. Lyell acknowledges the bone to be fossil, but expresses his disbelief that it has been found in the blue clay. "He could not ascertain that the pelvis had been dug out in presence of a geologist, or a practised observer; he believed, therefore, that it was picked up in the bed of the stream, and he suggests that the pelvis may have fallen from the summit of the cliff. If it really was found *in situ* at the base of the precipice, its age would more probably be 100,000 years."

It would thus appear that the Americans not merely claim to be in possession of real human fossils, but they assert that they were found in positions which render them doubly interesting, as bearing witness to the very remote period of man's existence upon the earth. As no valid reasons have yet been shown that the relics are not fossil, and have not been found in the positions indicated, the subject is yet *sub judice*.

Dr. Dowler's sub-cypress man (*Tableaux of New Orleans*) caused a great sensation at the time of the discovery, and is still quoted as a fact in the most recent publications. In the excavation of the gas-works at New Orleans, burnt wood was found at the depth of sixteen feet, and at the same depth the workmen discovered the skeleton of a man. The cranium lay beneath the root of a cypress tree, belonging to the fourth forest level below the surface, and was in good preservation. The other bones crumbled to pieces on being handled. The type of the cranium was, as might be expected, that of the original American race. If we take, then, the present era (of the last emergence of the present site of New Orleans) at 14,400 years, and add three subterranean groups, each equal to the living (leaving out the fourth in which the skeleton was found) at 43,200, we have a total of 57,000 years. From these data, it would appear that the human race existed in the delta of the Mississippi more than 57,000 years ago; and then ten subterraneous forests, with the one now growing, establish that an exuberant flora existed in Louisiana more than 100,000 years earlier; so that 150,000 years ago the Mississippi bathed the magnificent cypress forests with its turbid waters. In a note sent to Drs. Nott and Gliddon, April, 1853, Dr. Dowler adds, "Since I sent you the tableaux several important discoveries have

been made, illustrative of its fundamental principles in relation to the antiquity of the human race in this delta, as proved by works of art underlying, not only the live-oak platform, but also the second range of subterranean cypress stumps, exposed during a recent excavation in a cypress basin."

As a climax, we add the following ludicrous description of a fossil man and woman, inserted in *Silliman's Journal of Science*.

Fossil Man and Woman.—A Cincinnati paper of March 23rd, 1855, contains a narration of the discovery of "some very curious petrified human bodies" found in Pennsylvania in the bed of a stream, which is one of the branches of the Alleghany river. The account says: "These remains are supposed to be those of a man and woman, who by the wonderful petrificative process have been turned to solid stone," and they are regarded as "irrefragible proofs of the existence of man upon this revolving globe long before the periods when corals, crinoids, and trilobites first made their appearance." But "the man is the great curiosity—its feet are now wanting; its body and legs are composed of sandstone, and its head of quartz and gneiss." Thus, according to the narrator, the whole science of geology is upset over and over. The writer continues, "it is assumed that when first found the feet were on this male petrification, but as they seemed slaty and of a coal-like texture, they were burned by the women, who prefer utility to scientific discovery. It is certain the man when alive must have inhabited the sandstone for a period, and if, as we think is evident, he was buried with his head downwards, and at just such depth that his head came in the gneiss, and his body in the sandstone formation (he might have added, his feet in a coal-bed), then it is easy to conclude that his body petrified into sandstone, and his head into quartz and gneiss."

Had Mr. Barnum got hold of this interesting couple, he would no doubt have retrieved his fortune. The whole story seems one of those hoaxes with which Yankee editors now and then amuse their readers. The explanation of the learned editor is just as curious as his petrifications.

In a work* by Professor Brown, one of the first living mineralogists and geologists, which obtained the Prize of the French Academy, there occur the following passages relating to our subject: "There is no doubt that human bones and works of art have frequently been found mingled with remains of antedeluvian animals; but strenuous efforts have been

* *Researches on the Laws of Development of the Organic World during the Formation of the Surface of the Earth.*

made to discard these facts by the hypothesis that they have become mingled at a subsequent period by currents of water, or it was at least maintained that the impossibility of such an hypothesis could not be demonstrated. All the cases, however, are of such a nature that a judge without any preconceived theory, would not hesitate one moment to adopt the simultaneous existence of man with the extinct species found in the same place. Many would have been glad to make the appearance of man the starting point of a new era in the history of the earth. We must, however, acknowledge that it becomes a very difficult point to establish a distinct line of demarcation between the tertiary and the actual epoch."

Human Fossils in Europe.—So long back as 1820, Baron von Schlottheim published at Gotha an account of human fossils discovered near Koestritz, Upper Saxony. They are situated in gypsum quarries, and from their first opening the bones of man were found intermingled without order with those of extinct animals. The bones are contained as collections in Gera, and of the Natural History Society of Altenburg. "These human bones from the nature of the soil could not have been buried there," observes von Schlottheim, "nor have fallen into fissures during battles of ancient times; they are few, completely isolated and detached."

In the year 1853, at the Meeting of Naturalists at Tübingen, some old skulls, taken from old, so called, Celtic graves at Sigmaringen, were shown by the writer of the article on "Fossil Bones" in the *Morgenblatt*; he immediately received a letter from a Professor of Surgery in Edinburgh, requesting the loan of the skulls. English journals had spread the report that the Rev. Mr. Fraas had exhibited to the Society genuine fossil human skulls, which had been recognized as such by the assembly. The error arose that at the time the discussion turned on fossil human teeth of Melchingen, Professor Kurr, of Stuttgart, had such a tooth for years, which had been described and sketched, and which Jaeger and R. Owen had declared to be an undoubted fossilized human tooth. More than half a dozen of such teeth have been found in Melchingen mixed with the bones of rhinoceros and dinotherium, and having the same bluish colour which distinguishes these fossils: This was an enigma, for these teeth must be older than mammoth and megatherium if they were really human teeth. There was no doubt about their being fossils. The problem is now solved. A Bavarian soldier found, 1837, in the Pentelikon, near Athens, remains of monkeys (*Mesopithecus pentelicus*); and in

the same year Lartet discovered similar bones at Sansan. Lartet was sent by the French Academy to Greece, and found a large number of fossil monkeys. The molar teeth of these Greek monkeys perfectly resemble the Melchingen teeth, which are no longer held to be human teeth.

Of the ossiferous caves in Sicily, that which has been often described is the Grotto di San Ciro, two miles from Palermo. Another cave, the Grotto di Maccagnone, about twenty-four miles from Palermo, was lately the special subject of Dr. Falconer's research, as may be found in the *Transactions* of the Geological Society, June 22, 1859.

The interior of the cavern is lined with stalagmite, and at a spot on the roof Dr. Falconer found a large patch of bone breccia, containing teeth of ruminants, bits of carbon, shells of several species of helix, and a vast abundance of flint and agate knives of human manufacture, closely resembling the knives from Mexico, Stonehenge, Arabia, and that they appear to have been formed by dislamination. Dr. Falconer draws the conclusion, 1st, That the cave was filled up within the human period; 2nd, that the coprolites of a large hyæna were similarly cemented to the roof at the same period; 3rd, that subsequently such a great change took place in the configuration of the district as to have caused the cave to be emptied of its contents, excepting the patches of materials cemented to the roof and since coated with additional stalagmite.

Mr. Prestwich gives, as the result of the examination of the bone cave at Brixham, in Devonshire, that numerous bones of the rhinoceros tichorhinus, horse, cave bear, and the hyæna, have been found, and several flint implements, one beneath the antlers of a reindeer, and a bone of the cave bear imbedded in the superficial stalagmite in the middle of the cave.

In a cavern near Mialet (department of Gard), in France, human bones were found mingled with the remains of bears, pottery, bracelets of bronze, and a Roman urn. Tessier, who described this cavern, supposes that the grotto may have at one period been a den of bears, and that afterwards it was taken possession of by the aboriginal inhabitants who left there the coarse pottery, and that at a subsequent period the Romans may have used the cavern as a place of sepulture, which may explain the presence of the urn and bracelets.

Similar caverns have been found in the south of France, as in the caverns of Bize and of Pondres (department Herault), where M. De Christol found human bones mixed with the remains of pottery and extinct animals.

It is unnecessary to dwell any longer upon what is called the cavern evidence in favour of the antiquity of man. Many geologists still view it with suspicion. This much, however, is certain, that we are furnished with numerous well-authenticated facts of the admixture of human bones and human implements with the remains of extinct animals. Several of the explorers of the caverns, moreover, express their firm conviction that the association of these remains was not accidental, that is to say, the admixture did not take place after each portion had been deposited elsewhere, but that they were entombed at the same time; whence the discoverers infer the contemporaneity of man's existence with what are called the antediluvian animals.

M. Littré* makes the following remarks on some of the human remains found in Europe:—

“The finding of fossil monkeys, not merely in Asia and America, has naturally rendered the finding of human fossils less improbable.

“Not only in America have human bones been exhumed; the skulls discovered in various localities of Germany have nothing in common with those of the present inhabitants. They present a considerable flattening of the forehead, like the skulls of all the savages who had the custom of compressing that part of the head. Thus certain crania, found in the environs of Baden, in Austria, presented great analogies to the crania of African or Negro tribes, while those found on the banks of the Rhine and the Danube presented great resemblances to the crania of Carabs, or to those of the ancient inhabitants of Chili and Peru. It is true these determinations are still objected to by palæontologists: the remains are rare; the strata are uncertain; the bones may have been displaced by accidental circumstances, so that the terrain which concealed them may have appeared ante-historic. All these objections may render a suspension of judgment advisable; but do not oblige us, as is frequently done, to peremptorily reject all idea of a humanity anterior to the present humanity, the more so as it is not easy to dispose of the fact that these crania do not resemble those of the present inhabitants of the respective countries. No doubt these men, whoever they may have been, may have preceded the arrival of the Celts in Europe, and yet appertain to the historical period, though they have disappeared without leaving any trace.

“We have as yet no standard to measure the time elapsed. From the moment when man fashioned the stones to make himself implements to the time when we see him erect temples and pyramids,

* From *Revue des Deux Mondes*, 1858.

and inscribe his monuments with hieroglyphics, a vast period must have elapsed. When the Egyptian priests conversed with Plato, and gave themselves an existence of ten thousand years, present investigators do not consider it as an idle boast."

The Works of Man.—Stone implements were well-known to the ancients by the name of *ceraunia* (thunderstones), and are particularly mentioned by Tacitus, as being used as implements of war. The name was probably derived from the Ceraunian mountains in Epirus, where, on account of the frequent and violent thunderstorms, they were said to be more abundantly met with than elsewhere. It is also known the ancients manufactured of these minerals sacrificial knives, battleaxes, hammers, etc.

Stone implements are also found in great abundance in Spain, and the Spanish peasants preserve them with a sort of superstition, believing, also, that they had fallen from heaven.

Seventy years ago a letter, containing the following passages, was addressed by John Frere, F.S.A., to the Rev. John Brand, then the secretary of the Antiquarian Society. The letter, with illustrations of the objects alluded to, is to be found, page 204, in vol. xiii of *Archæologia*.

"I take the liberty to request you to lay before the society some flints found in the parish of Hoxne, in the county of Suffolk, which if not particularly objects of curiosity must be considered in that light from the situation in which they were found."

Mr. Frere considered these flints as weapons of war fabricated and used by a people who had not the use of metals. They lay in great numbers at a depth of about twelve feet in a stratified soil, which was dug into for the purpose of raising clay for bricks. The strata were as follows:—

1. Vegetable earth, one foot and a half;
2. argill, seven feet and a half;
3. sand mixed with shells and other marine substances, one foot;
4. a gravelly soil in which the flints are found, generally at the rate of five or six in a square yard.

In the stratum of sand were found some extraordinary bones, particularly a jaw-bone of enormous size, of some unknown animal, with the teeth remaining in it. This it appears has been presented, with a huge thigh-bone found in the same place, to Sir Ashton Lever, and is, therefore, probably now in the Parkinson Museum.

The situation in which these weapons were found, observes Mr. Frere, may tempt us to refer them *to a very remote period, even beyond that of the present world*. Mr. Frere further remarks that the

manner in which they lie would lead to the persuasion that it *was a place of their manufacture*, and not of their accidental deposit; and the numbers of them were so great, that the man who carried on the brickwork told me that before he was aware of their being objects of curiosity he had emptied baskets full of them into the ruts of the adjoining road.

This letter, containing such curious facts, pregnant with such important inferences in relation to the history of mankind, seems scarcely to have excited the interest of the learned body to which it was addressed. It does not appear that any discussion was raised on the subject, nor any further notice taken of the communication. The facts and the very name of the discoverer were forgotten, and allowed to lie entombed in the ponderous pages of *Archæologia* for more than half a century before they were disinterred and brought to light again by the zeal of Mr. John Evans. And yet short as the letter is it contains the very essence of all subsequent discoveries and speculations on the antiquity of the human race.

Boucher de Perthes.—Although, as has just been shown, not the first discoverer, yet to M. Boucher de Perthes, the amiable and accomplished president of the Emulation Society of Abbeville, belongs the great merit of having successfully attracted the attention of the learned world to the primitive industry of man. It may be useful to trace the process by which M. Boucher arrived at his conclusions as stated by him in his recent work *On the Antediluvian Man and his Works*. It appears that as far back as 1805, M. Boucher visited the Roland Grotto, near Marseilles, and in 1810 the Grotto de Palo, in the Papal dominions, where among some animal bones he found certain flints, which struck him as having been worked. The yellow tint which distinguished some of these stones made him suspect that they were not in their original position, but that the colour was due to the ferruginous nature of the soil with which they were originally in contact. As certain beds of the diluvians exhibited the same shade as the flints, his endeavours were chiefly directed to find the stones *in situ*.

Circumstances favoured his labours. Extensive works undertaken for the fortification of Abbeville,—the digging of a canal, the preparations for the railroads between 1830 and 1840, successively laid open numerous beds of the diluvium, upon which the valley of the Somme reposes. It was in 1838 that M. Boucher first submitted his implements to the Society of Emulation of Abbeville for inspection. In 1839 he brought some of them to Paris, where he showed them to

several members of the Institute, among others to M. Brogniart, who was perhaps more than any other interested that the discovery should turn out a delusion, because he held with Cuvier that man was of recent origin, and not the contemporary of the extinct pachydermata. M. Brogniart was, however, soon converted. M. Boucher entertained strong hopes that his work on *Antediluvian Antiquities* would dissipate all doubts. Nothing of the kind. Nobody would believe his theory, which every one who chose could have verified on the spot; it met with utter neglect.

It was thus that M. Boucher's theory peaceably slumbered for seven years, until in 1854 Dr. Rigollot, who, on mere hearsay, had for ten years been a stanch adversary of the antediluvian theory, decided to judge for himself by visiting Abbeville, Saint Acheul, and Saint Roch. His conversion was prompt and decisive, and, like an honest man, he publicly declared his error in a memoir on flint instruments found at Saint Acheul, Amiens, etc.

"This clear and conscientiously written memoir," says M. Boucher, "recalled attention to my work. Its reception was, unfortunately, not favourable. Being a purely geological question, it became the subject of religious controversy. Those who did not attack my religious belief accused me of temerity. What! an unknown archæologist, a geologist without a diploma,—a strange pretention indeed to attempt subverting a system confirmed by long experience, and adopted by the most eminent men on science!

M. Boucher, however, persevered, and he is now reaping his reward; for, as we shall presently see, the most distinguished geologists now range themselves by his side.

The questions we have to deal with in relation to flint implements are the following:—

1. Are these rude objects, which pass by the name of antediluvian hatchets, really of human workmanship? or may we not, with equal probability, assume that the shape of these flints is simply accidental, and produced by natural agencies.

2. Are they found in undisturbed ground, and if so, what is the probable age of the strata in which they are imbedded?

3. Assuming that the flints are the result of human labour, was man the contemporary of the extinct mammalia, with the bones of which the flint implements are associated.

4. What race of men was it that fabricated the implements?

There can be no doubt that, at first sight, even an unprejudiced investigator may see in these rude flints, with their rugged surfaces, nothing, or at least very little, characteristic of human labour.

It is equally certain that flints may, by being knocked about with other hard stones, or by other agencies, be naturally fractured in a variety of curious shapes, simulating the forms of implements or other objects. How, then, are we to distinguish between the accidental forms or freaks of nature, as some have called them, and those produced by the human hand?

Mr. Edwards, of Birmingham, asserted that he saw in his own glass manufactory the operation of a natural law producing fragments of glass, (a kindred material to the flint), which closely approach the forms of celts. When any imperfection renders an article useless for its intended purpose the workman puts it away without annealing it, when in a few minutes it is riven to fragments, which will be found invariably either wedgelike, or following more or less the general shape of arrow or spear heads.

The theory which he bases upon these facts, he states thus:—“I suppose that in the early geologic periods masses of flint or large boulders may have become heated by subterranean fires, and while in an incandescent state have been suddenly thrown by volcanic force to a cool place; the outside of the mass would soon begin to contract, while the inside would retain its heat and its expanded condition: the struggle between the two forces would go on until the mass was rent to fragments, and each of these fragments would be one of the ‘works of art,’ of which we have lately heard so much.” And of which, we venture to say, Mr. Edwards will hear much more in time to come.

To this theory of a practical man, Dr. Collyer simply replied that, in the first place, “the parallelism is not correct, as the substances are so different in their structure and their mode of production.

“Secondly, had calcination or heat been the cause of the chipping or fracture of the portions, which indicate them to be work of human agency, how is it that those portions of the boulder, not essential to the instrument, are always left unchipped?

“And, thirdly, had calcination in any way acted in producing these partial detachments, how is it that the untouched surface does not exhibit the action of fire?”

Characteristics of Antediluvian Implements.—The commercial adage that demand creates supply, applies equally to flint implements. Not unlike the manufacturers of relics in the holy cities of the East, the workmen at Abbeville and St. Acheul soon found it to their advantage to fabricate antediluvian hatchets on their own account, and to pass them off to visitors as the genuine article.

Thus M. George Pouchet tells us that when, in August 1859, he visited Saint Acheul, the miners tried to impose upon him; but he soon detected that the pretended *langue de chat* was a deception, and that the flint had been fraudulently introduced into an artificial cavity. When, however, after the lapse of some days, he succeeded in finding some hatchets embedded in the diluvium under such conditions that a mystification was out of the question, his doubts were removed, and he came to the conclusion that the flints are objects worked by man at a period long anterior to that usually assigned to man's appearance upon the earth.

It is, therefore, of some importance to distinguish the spurious from the genuine implements. M. Pouchet thinks that in the progress of time infiltrations reached the diluvium, depositing a crust of carbonate of lime of about one millimetre in thickness upon one of the surfaces of the flints *in situ*, which incrustation is seen upon all the genuine hatchets at Saint Acheul, and is absent in the spurious flints fabricated by the miners. Some of the genuine implements have, moreover, the characteristic peculiarity of presenting upon the surface, not covered by calcareous deposit, dendritic impressions. Though the existence of dendrites is not an absolute mark of diluvian implements, since it is also found upon some Celtic hatchets, it still offers in most cases a fair presumption in favour of great antiquity.

Colour—The hatchets found at Amiens are all of flint, and of three colours; black, white, and red. The red and the white generally occupy the superficial layer. The hatchets found in a dry soil have remained black. Those reached by ferruginous infiltrations have become red. The diluvian implements have, in fact, generally the colour of the stratum in which they were embedded; so that a flint deposited between two different seams bears on each surface the colour of the respective seam with which it was in contact. This double shade penetrates the stone, the internal part being generally black. In post-diluvian implements the colour is generally the same throughout. Thus a Celtic hatchet may be imitated, but a spurious diluvian implement is easily detected. Diluvian implements have never been found polished.

Another great characteristic of worked flints is their striking resemblance to each other in almost every country where they have been found. Individually each diluvian implement may be considered an accident; but when viewed collectively, and it is seen that the chips have been taken off in the same places and in the same manner, presenting identical forms, obviously the result of identical intention, we

are irresistibly led to the conclusion that the hand of man has done it. Wherever they have been found, whether in the east or in the west, in the south or in the north, they resemble each other in form, though they may differ in finish.

On comparing the woodcut representing the flint implement found by Mr. Taylor in the Mound Abusharein (see *Proceedings* of the Society of Antiquaries, No. 2, 1860) with that of the flint weapon found by Mr. Frere, at Hoxne, in Suffolk, as it appears in the thirteenth volume of *Archæologia*, published about sixty years ago, they appear nearly identical in shape and external aspect.

M. Boucher's collection of flint instruments, probably the most interesting of the kind in existence, is arranged according to the beds in which they were found.

1. Modern remains. 2. Medals and other metallic objects of the Roman period. 3. Similar objects found at greater depth, mingled with stone hatchets of the Gallo-Roman period. 4. Stone hatchets of the Celtic period, found at a still greater depth, not mixed with metallic objects of the Celtic period. 5. Objects from the soil beneath the Celtic bed, consisting of two strata, the superior stratum presenting no traces of human workmanship, while the lower stratum is the diluvium containing the implements called by M. Boucher "antediluvian hatchets."

One of the most serious objections* which have been urged against

* One of the objections which was originally urged against the assumption that these implements are works of art is the large quantity found in certain localities. Thus, one of our most esteemed antiquaries, Mr. Thomas Wright, said, (*Athenæum*, June 18th, 1859), "The quantity of these implements which are found—two or three hundred in one gravel pit, with an intimation that they occur similarly through the whole drift formation, seems to me to be quite enough to make us hesitate. If we receive them as made by the hand of man, we must suppose that at this extremely remote period the surface of the globe was covered with human beings, who spent all their lives in chipping flints into the rude forms of weapons, and throwing them about."

Another circumstance that induced Mr. Wright to disbelieve that these flints have been fashioned by the hand of man, is the total absence of anything of what we call finish, and that the forms might have been produced naturally, by violent and continued gyratory motion—perhaps in water, in which they were liable to be struck by other bodies in the same movement."

Now the absence of anything like "finish," which is urged as an objection, chiefly by archæologists who, it has been well observed, are more accustomed to the productions of a later period, may be disposed of by the fact that even some of the Celtic hatchets found in Celtic graves, and the authenticity of which is undoubted, are equally uncouth, unpolished, and produced by simple percussion.

Despite of their rough surface the objects present generally such a uniform shape, which stamps them as the work of man. In many of the hatchets it is found that the circumference describes regular elliptic curves, the two surfaces being convex and symmetrical like a lens. The implement is seen to diminish gradually on all sides. No flints broken by accident or design furnish such regular forms. Hence, even the workmen in France were struck with their regularity, and gave them the name of "cats' tongues."

the worked-flint theory arises from the circumstance that no human bones, which are considered as capable of preservation as those of the extinct animals, are found in the same beds with the flints. But though there can be no doubt that the finding of human fossils in the diluvium mingled with the works of man would at once clinch the argument, their absence cannot invalidate the legitimate deduction of the geological theory, unless the evidence in favour of the flints being worked be entirely rejected.

In the last edition of Professor Phillips' *Manual of Geology*, that gentleman expresses his surprise that the bones of man should so rarely be met with in the deposits of the diluvium, since at that time the earth had assumed its present form, and was inhabited by quadrupeds closely allied to those which now exist, especially the horse and domestic cattle, so singularly serviceable and dependant on man. He justly observes that those parts of the earth's surface to which tradition and, perhaps, general reasoning seem to point as the first sites of the human race, the central regions of Asia, have been as yet little examined with reference to this question. It may be very possible to discover these there even in abundance. Upon the whole, he considers that it may be stated, as a general admission, that man did not exist on the globe during the secondary and, probably, not during the epoch of eocene and pleiocene formations, and that, though sufficient evidence for man's coexistence in northern climes with the mammoths and hippopotami is yet wanting: but as the races of oxen, horses, camels, etc., had then begun, it is not an unreasonable expectation that eventually the question will be decided in the affirmative.

Boucher de Perthes, in a letter addressed to the secretary of the Paris Anthropological Society,* writes that he found his first antediluvian hatchets in 1839; that he had shown them to several academicians in 1840, especially to M. Alexandre Brongniart. That he had excavated them a year before the miners of Abbeville had discovered any, and that he had considerable trouble to teach the workmen to distinguish the worked flints. It was the same with the miners at Amiens, who only commenced to search for them in 1853, after M. Rigollot had taught them how to distinguish the flints.

M. de Castelnau, after stating that he has no preconceived idea against M. Boucher's doctrine, considering that the ideas of Cuvier in regard to the recent appearance of man had appeared open to many objections, still required rigorous proofs. Now, among the imple-

* Séance Nov. 17th, 1859.

ments presented, there was in his opinion but one perfectly characteristic of human workmanship, namely, hatchet No. 5, found by M. G. Saint-Hilaire, and justly referred to by him to the Celtic period. It is even questionable whether this object without a handle, and which was used rather as a wedge (*coin*), deserves the name of a hatchet. He still more objected to that name being given to the older objects, of which the forms are so different from the form of real hatches. These latter, excavated from the diluvium, appeared to him very doubtful. Are these coarse, irregular, angular objects, with their rugous surfaces, really the result of human labour; and may they not with equal probability be attributed to the percussion of flints rolled in the same torrent?

Among the innumerable fragments, there may be some the forms of which remind us of the implements fabricated by man at a later period, and which are designated by the name of Celtic hatchets.

M. Baillarger agrees with M. Castelnau, and excepting the Celtic hatchet, sees nothing characteristic of human labour in the other objects. He also considers the name of hatchet objectionable. A hatchet should have a handle and a hole to receive it. This hole exists in some Celtic implements, which then deserve the name. There is no trace even in Saint-Hilaire's implement of a hole; it was used as a wedge.

M. Broca considers that the name given to these implements is of little importance. Some of the Celtic implements have holes, and bear legitimately the name of hatchets; others have none, being evidently the product of art less advanced. As to the diluvial instruments, it is merely by extension that the name hatchets has been given to them.

M. Castelnau. If the flints in question are really worked by the human hand, that race must have been much inferior to the present race. A race which has left no other traces of its industry than these crude and nearly shapeless objects, can have been but little superior to the monkey species. Much more mental energy would not be required by the gorilla to produce similar instruments.

M. Bertillet. At first sight, one is apt to agree with M. Castelnau, but a closer investigation shows that, despite the irregular asperities of the surface, the objects present such a general uniform shape, as is the index of real workmanship. He draws attention to hatchet No. 1. Setting aside the superficial rugosities, the circumference describes a regular elliptic curve; its two surfaces are convex and symmetric, like those of a lens. The maximum thickness ex-

actly corresponds to the centre of the ellipse, the instrument then gradually diminishes on all sides. He had seen flints broken by accident either by the hand of man or other violent action, but had never seen forms like those presented. Certainly, if the object were polished, it might be compared to the best works of a later period. This particular form extends to a large number of the implements, and the picturesque name "*langues de chat*" given to them by the miners shows that they have been struck by their regular forms. The objection that the surfaces are rugous appeared to him without much value. The first men possessed no metallic engines requisite to polish hard stones, an art but slowly developed. Even hatchet No. 4, found by Boucher de Perthes in a Celtic sepulture, the authenticity of which is undoubted, still presents a rugous surface, and appears to have been produced by simple percussion, like the implements of the diluvium.

M. Lagneau. It would be of the highest interest to determine the period in which the race of men lived who fabricated the implements found at Abbeville and St. Acheul. The race was, no doubt, anterior to the Celtic epoch; and may be anterior to the so-called original race which preceded the Gauls and Celts in western Europe. The race of the ancient Britons, of which the English anthropologists have found traces in the British Isles, and which Dr. Ware of Edinburgh, from a passage of Tacitus and other documents, considers of Iberian origin, had been supplanted and destroyed by the Celts. Is it by this antique race, which probably had also occupied the north of France, that the diluvian hatchets had been worked? Was it not rather to a still older race, with narrow crania and a sharp facial angle, such as have been found by Mr. Spring in the environs of Namur, that they must be attributed?

M. Castelnau still objects. Let it be remembered that flints for firearms were formerly fabricated by mere percussion, by which they received a perfectly regular form. Even at this day, savage nations, ignorant of the use of metals, produce stone implements, which may be considered as masterpieces compared with the objects found in the diluvium. He persists, therefore, in his opinion, that if these flints are really the work of man, the race which fabricated them must have been much inferior to the present race.

M. Broca is disposed to admit with *M. Castelnau* that an antehistoric race, of which Boucher de Perthes has discovered the traces, was much inferior to the succeeding races, and probably inferior to any existing, though it be somewhat difficult to conceive a human

race inferior to the Tasmanian, to the Aïgtas of the Philippines. It may be remarked that the human crania, more or less fossil, found in Europe, in old strata beneath modern beds, belong mostly to the prognathic race, much inferior to the races which occupied Europe since the historic age. The fossil cranium, found in 1844 by M. Aymard upon Mount Denise near Puy-en-Velay, presents, it is true, the Caucasian shape, but the crania discovered in the environs of Baden, in Austria, present the African type; while those found on the borders of the Rhine and the Danube approach the shape of the crania of the Caribs. The human bones found in Mount Chauveau (Namur), forty metres beneath the bed of the Meuse, are thus described by Dr. Spring. Cranium very small in the absolute, also very small when compared with the considerable development of the jaws; forehead receding, temples flattened, nostrils large; dental arches very voluminous, inclined forwards, supporting oblique teeth; facial angle about seventy degrees. The bones of the limbs rather short, indicating a stature not quite as high as that of the Laplanders. It may be added that this race cannot be compared with the actual hyperborean race, who have large globular heads and vertical teeth. It must then have been a race actually extinct, whose small crania, development of the jaws and prognathism, are evident marks of inferiority. It becomes thus probable that the human beings who lived before the formation of the diluvial beds, more ancient than those whose bones were discovered by Dr. Spring, must have been of at least an equal inferiority.

These and other considerations induce the belief of an inferiority of these primitive races. The mere rudeness of the diluvian hatchets is scarcely sufficient by itself to come to that conclusion, as it requires a long time before even an intelligent race, deprived of the use of metals, arrives to a degree of producing refined objects of industry. If a number of Europeans were landed on a desert island, naked and without any instruments whatever, they would be much embarrassed to produce, without any metal, objects much more perfect than those flint implements.

M. Baillarger. It seems to result from the discussion that some, at least, of the flint implements found in the diluvium are really of human workmanship, which, in itself, is of great importance; but what is of greater interest is to appreciate, if possible, the intellectual state of the people who produced them. It seemed to him that the race was physically and morally inferior to the succeeding races. The smallness of the skull and of stature, the great development of the

jaws, concur to prove it. The race exists no longer in Europe as a race, though they spring up occasionally among actual races. Such individuals bear the name of Microcephali, of which he promised to give some account to the society on a subsequent occasion.

*M. Broca.** The absence of polish cannot be considered as a negative proof, as hatchet 4 from a Celtic sepulchre, is equally cut by percussion, which may also be said as to the knives, for a similar Celtic unpolished knife has been in a Celtic grave. Has no doubt whatever as to the relative inferiority of the primitive races, as everywhere their bones belonged to inferior types. Jass Steenstrup, of Copenhagen, states that in the inferior beds of Denmark all the crania are brachycephali. These brachycephales of Denmark have not passed the stone period. The initial period of human existence might be called the age of wood, when the ancient heroes, like Hercules, fought savage beasts with clubs. This period did not last long, and the stone period commenced. The Autochthones of Denmark, described by M. Steenstrup, lived, nevertheless, at a more recent period than those who fabricated the hatchets found by M. Perthes in the diluvium. The former were sufficiently advanced to polish the flints by friction. We also find in the so-called Celtic period (though much anterior to the actual arrival of the Celts), cutting instruments produced not by simple fracture but by repeated friction. It must be added that the position of these hatchets in the bed of the diluvium indicates that the period was separated from the present epoch, if not by a general geological revolution, at any rate by a local cataclysm, in which possibly the primitive race has perished like the elephant and rhinoceros. Possibly, also, the people saved themselves in time. And until human bones were found in the diluvium it might be a doubtful question whether the brachycephalous race existed in Western Europe before the arrival of the Celts and other dolichocephalous races, descended or not from these people, the traces of which were discovered by Boucher de Perthes.

M. Trelat. It has been said that the people who made the flint implements must have possessed but little intelligence. I have examined the arms of the savages of Oceania, in the Anthropological Museum of the Louvre, and although these races had ample means to perfect their industry for centuries, and though a great many of their arms exhibit considerable skill, flints still serve them as cutting instruments. There are some of these polished, others are rough ;

some are fabricated by percussion, others by friction. I must also observe that the expressions, stone, bronze, and coin period must not be taken literally. The invention of the hard metals did not immediately make the peoples renounce stone implements. Among the objects found in the Danish and Scandinavian tombs, even down to the ninth century of our era, stone instruments are found commingled with metallic implements. I was also anxious to ascertain the cause of the white or greyish colour which characterizes most of the hatchets of the Celtic period, and which might cause the belief that they are made of calcareous matter. These hatchets are really flint, despite the appearance, and their colour is due to the calcination to which they had been subjected. This was a common practice amongst the Gauls. They thought, by subjecting them to fire, their arms became harder, and it was not merely the stone implements, but also their wooden arms which were thus treated.

Surprise has also been expressed at the great number of worked flints found in confined spaces at Amiens and Abbeville; the following facts may, perhaps, explain it. Not far from Dieppe is a spot called *la cité des limes*. The origin of the word, and the date to which most refer the existence of this so-called city, is unknown. I have preserved the name city, as such is the expression, though it is well known that the ancient Gauls did not build; their cities were but intrenched camps, where they elevated some rude huts. Well, in this *cité des limes* there have been found the vestiges of an ancient manufactory of flint implements. A great many of these have been found to be knives produced by chipping, as well as polished hatchets. Here various instruments were separated from each other at regular distances. One of these hatchets is polished at one end and rough at the other. None of them has a hole for the handle. They were handled by pincers, as the islanders of Oceania do to this day. The process of pinching was conserved for a long time even for bronze instruments. I have seen numerous examples of them in the Louvre.

There has been found, at St. Acheul, a very different object; it is a necklace, or rather a bracelet, composed of about twenty spheric beads, varying from seven to fourteen millimètres in diameter. All these beads are perforated by a central hole, and are mostly composed of a rather soft calcareous substance. Two of them are cut out in a mass of madrepore. All these beads were evidently parts of the same ornament, for they were found very close to each other.*

* The *Coscinopora globularis*.

M. G. St. Hilaire. The fact communicated by M. Trelat supports the opinion of M. Dunoyer, who believes to have found, at Amiens, the vestiges of an ancient manufactory of worked flints.

M. Bertillon has read, in *Cosmos*, that in Spain a large number of stone implements had been found, both in the soil and in the tombs. The Spanish peasants preserve these implements with a sort of superstition. The author of *Cosmos* thinks that these instruments were not arms, but were used by the ancient Iberians for religious ceremonies. They were believed to have fallen from heaven.

M. Broca agrees that the expression, stone, bronze, and iron period must not be taken in an absolute sense. A new industry does not immediately replace an old one. The first metallic instruments were too precious and rare to be general. The chiefs only possessed them, while the people for a long time after used stone implements, and several centuries had elapsed before the use of the stone implements was given up. Nevertheless the intermediate period was not so long as imagined by M. Trelat; that it continued in Denmark until the ninth century. As these implements figured also in the religious ceremonies, they were deposited in large numbers in tombs, as long as the same culte continued. Thus, then, in Denmark they are found as late as the ninth century, because at that epoch the Danes embraced Christianity. But it must not be believed that they used the implements until that period as tools or arms.

Now far be from us to complain of the opposition which the worked-flint theories have met with. There is scarcely an instance of any great truth or any great fact having been enunciated without having been received either with a shout of derision or violent indignation, not merely by the ignorant masses, but by learned bodies. And thus it should be; it is the constitutional opposition in the republic of the mind. Every alleged new truth is frequently so much mixed up with error, and every new fact so much combined with fiction, that they are all the better for undergoing a thorough sifting examination. But there is a medium in all things. Whilst there is and ought to be a rational scepticism which tries to prove all things, and holds fast to that which is good and true, there is also such a thing as fanatical scepticism, which shuts its eyes to all evidence, and tortures itself to find out the most far-fetched and improbable hypotheses for rejecting or explaining away any new fact or hypothesis, specially in such cases when the new theory apparently clashes with long cherished and preconceived notions.

We shall endeavour to examine whether the opposition to the

worked-flints theory, with the evidence in its favour, partakes more of the former than of the latter character.

There is one stubborn fact which cannot be gainsaid, and which is this: that all who have visited the spots, though they may have come to scoff have remained to pray; that is to say, went away with the conviction that the worked-flint theory is a great fact.

M. Alfred Maury, member of the French Institute, formerly a sceptic, after having found the traces of man in undisturbed ground, on the banks of the Somme, says,* “All doubts raised by geologists as to the exactness of Boucher de Perthes’ observations must vanish. Man has, indeed, left the proofs of his existence at a period the antiquity of which cannot yet be calculated, but which contradicts all historical inductions. These hatchets cannot have been transported from afar, for their edges are scarcely blunted; they denote a very primitive state of human society.”

Professor Albert Gaudry, of the Paris Museum of Natural History, the author of several works on Palæontology, was sent to Amiens and Abbeville, in August 1859. After having minutely examined and analyzed the soil, and found that it had not been disturbed, he extracted, in the presence of MM. Hittorf, Ponsard, and Garnier, nine hatchets from the rock in which they were embedded among fossil bones. His Report to the Academy of Sciences, read October 3rd, contains the following conclusions at which he had arrived.

1. Man was the contemporary of the *Rhinoceros tichorhinus*, *Hippopotamus major*, *Elephas primigenius*, *Cervus somonensis*, and other extinct animals.

2. The bed called by geologists the diluvium has been formed, partly at least, after the appearance of man. The formation has doubtless been the result of the great cataclysm.

Professor Gaudry cautions investigators not to quit the miners for a moment, and to assure themselves that the implements are *in situ*.

M. de Saulcy, the celebrated antiquary and traveller, who at first strongly opposed the theory of the antediluvian man, now expresses his opinion that the presence of the works of man in the diluvium, and the existence of man at the same time and at the same places with the huge animals now extinct are incontestable facts.

M. Lartet says†—“Of all discoveries proving the high antiquity

* *Revue des Deux Mondes*.

† Extract from a Note presented by M. E. Lartet to the Académie des Sciences, March 19th, 1860, on the “Geological Antiquity of the Human Race in Western Europe.”

of the human species in the west of Europe, the worked flints collected by Boucher de Perthes are the most conclusive evidence.

"It is now admitted as a geological fact that England and the continent were united anterior to any historical tradition. This continuity is proved also by the actual presence, on both sides of the channel, of the same species of land animals the original intermigration of which could only have taken place on terra firma."

D'Archiac (*Bulletin de la Soc. Geol.*, t. x) thinks that the separation of the British Isles from the continent had taken place *after* the deposit of the diluvian gravel and before the ancient alluvion. The fact is, that the phenomenon which has produced the *Loess* or ancient alluvion in the north of France and Belgium has left no trace in England. On the other hand, Elie de Beaumont has clearly indicated the relations between certain dislocations of the system of the great Alps and the erratic alluvions in our valleys. The conclusions to be drawn from these hypotheses are manifest: the human race which has fashioned the flints of the diluvium of Abbeville and Amiens had taken possession of that country at the time the British Islands were yet connected with the continent, since the separation of these isles had only been effected after the formation of the diluvian banks where the implements are found. As the formation of these diluvian banks was one of the consequences of the last Alpine dislocations, the same human race must have existed before central Europe had attained its actual orographic state. The apparition of man in the *western regions of Europe* must therefore date from an epoch when the surface of that continent must have been considerably different from what it is now.

The question now is, has there, between that phase of the human period and the present one, *in that part of our continent*, been a sudden great revolution—a catastrophe sufficiently general—so as to interrupt a regular succession of organized beings? Do we find of such a catastrophe indubitable traces? If in the class of mammalia we find the disappearance of some species (ten at most), observation tends daily to establish that this disappearance was the result, not of a simultaneous destruction, but of successive extinctions, which appear to have been gradual in time and space.

We arrive inevitably at the conclusion that the terrestrial population of our continent has passed through all the so-called critical phases of the long *quaternary* period so variously affected by geological phenomena. If the persistence of species and the continuation of habitat has been possible for animals of all kinds, it must have been equally

possible for man their contemporary, placed in the same circumstances. Why should there have been a biological intermission as regards man only when it is demonstrated that there was none in the animal species."

M. Lartet also writes*—"I drew, also, the attention of the Academy to observations since frequently made on the traces of intentional action on the fossil bones found in the same beds as the flints, or in other layers of the same age. In announcing, not without hesitation, these facts, I had no wish to force their immediate adoption, but rather to provoke researches in the same field. Now, however, as new observations seem to confirm my first impressions, and being now able to submit well authenticated specimens for the examination of men eminent in science, I feel more confidence in submitting the following conclusions.

"The impressions on the fossil bones are evidently the work of man. These marks consist of excisions and incisions so neat and penetrating that they could only have been effected on the bone while yet in a fresh state not yet deprived of animal matter. The numerous fossil bones which present these incisions belong partly to large extinct mammalia of the pre-historic period (*Megaceros hibernicus*, *Cervus somonensis*, *Rhinoceros tichorhinus*). Others belong to the common stag, the aurochs species, still existing. The marks on the latter are not less valuable considering that these bones have been found in the same beds intermixed with the bones of the *elephas primigenius*, the rhinoceros, and the megaceros.

"I may also observe that remains of the aurochs, of the stag, and of other still existing species, have been found in England, France, and Italy in the lower tertiary strata, and ought consequently to be older than those in which the bones of the *Elephas primigenius* and *Rhinoceros tichorhinus* are found. Thus, the aurochs and the stag are more entitled to be called antediluvian animals, if we are determined not to banish this improper expression from science.

"I ought to add that hitherto I have not observed unquestionable traces of human workmanship on the bones of the fossil elephant nor on those of the great carnivora of that epoch. The worked bones found in the caves belong nearly all to ruminants or horses. I have, however, found upon rhinoceros bones well marked impressions. The observations, however, on cave bones do not furnish the same degree of precision and certainty. I refrain, therefore, from drawing from them any deduction.

* "Geological Antiquity of Mankind," *Comptes Rendus*, April 19th, 1860.

"I would but remind the Academy that the specimens presented with my note on March 19 are all well authenticated as coming from the diluvium, the geognostic condition of which has been well established, or from other strata of an equivalent age."

M. Collomb says*—"The thesis I purpose sustaining is that of the existence of man prior to the existence of the old glaciers. In my view, man existed at the commencement of the quaternary period, and was the contemporary of the *elephas primigenius*, the *rhinoceros tichorhinus*, the *ursus spelæus*, etc., and many other extinct species, which are only found in the deposits immediately succeeding the tertiary series.

"To arrive at these conclusions, it must be first admitted—

"1. That the quaternary deposits (of which the authors have given sections) have not been subsequently disturbed.

"2. That the objects of human industry found in them are unquestionably the works of the human hand, and that they have not been subsequently introduced in their natural positions.

"This being granted, let us see what passes in the basin of the Somme, where Boucher de Perthes has collected so many flint implements.

"The following is the section which I have examined, in company with M. Lartet, at Saint Acheul. Omitting details, I find the following:—

"1. Superior portion, lehm (loam, clay) or loess.

"2. Middle portion, beds of grey and red sand, with small beds of silex.

"3. Inferior portion, gravel, the greater portion of which is formed of rolled silex and chalk, containing flint implements.

"In the basin of the Seine the quaternary terrain is, according to D'Orbigny, formed,—

"1. Lehm and vegetable earth.

"2. Red diluvium, quartzose sand with gravel, and marl without any shells.

"3. Grey diluvium with granitic elements, beds of marl sand with lacustrine shells; gravel at the base containing the remains of elephants and the rhinoceros.

"It is in the inferior portion of the grey diluvium at Grenelle that M. Gosse found a flint hatchet, exactly resembling those I found at

* "On the Existence of Man prior to the Apparition of the Ancient Glaciers." Letter by Ed. Collomb to Alph. Tarre; *Bibliothèque Univ. de Genève*, tom. viii. 1860.

St. Acheul; he found there other objects fashioned by man amongst the bones of extinct mammals.

"In the department of the Yonne, in the grottoes of Arci, M. De Vibraye noted the following arrangement:—

"1. Superior part, argillaceous lehm.

"2. Middle part, sand and calcareous gravel, derived from the adjoining mountains.

"3. Inferior part, rolled gravel, originating from distant rocks, namely, from the Morvan.

"It is in this inferior bed that he found a fossil human jaw, with a head of the *Ursus spelæus*.

"In short, the sections of the quaternary terrain may (omitting local details) be condensed in three distinct strata.

"The superior, known by the name lehm or loess.

"The middle, of sand, gravel, etc., but little rolled, the origin of which is not from a great distance (red diluvium of Paris).

"The inferior, rolled gravel, origin more distant (grey diluvium of Paris).

"These sections being admitted, I shall now demonstrate that man made his appearance *prior* to the ancient glaciers. For this purpose we shall examine the quaternary deposits of the valley of the Rhine, and also those of a valley in the Vosges; we shall not find man there, but we institute some comparisons which, if they do not carry conviction, may throw much light upon the question.

"The quaternary terrain of the valley of the Rhine, from Basle to Mayence, is composed of three characteristic deposits, like the rest of France.

"Superior, lehm.

"Middle, gravel, derived from the Vosges on the left bank of the Rhine, the Black Forest on the right bank, and the Jura above the basin.

"Inferior, gravel exclusively composed of pebbles of Alpine origin.

"In the interior of a valley of the Vosges we have the following section (Diagram of section).

"1. Moraines, well characterised.

"2. Rolled gravel, without any striated pebbles.

"3. Granite, or transitive rock.

"The terrains present themselves in the plains and the mountains in the following manner (Section given):—

"1. Moraine in the mountain, lehm in the plain.

"2. Middle, rolled gravel of a local origin.

“ 3. Inferior, rolled gravel of Alpine origin.

“ In the plain of Alsace the deposits are regularly stratified, not having experienced a posterior dislocation; it is not so perhaps in Switzerland, in the perimetre of the action of the Alps, where the torrential deposits, the cones of dejection, etc., have acted upon the surface of the soil, and have changed the regular order of superposition.

“ Thus, in Alsace, the lehm or loess of the plain corresponds synchronously with the ancient moraines of the valleys of the Vosges.

“ Accordingly it seems to me that the following parallel may be established.

In the north-east of France, lehm.

Middle deposits of sand and gravel, known by the name of red diluvium, (valley of the Somme, the Seine, the Marne).

Inferior deposit, gravel derived from a great distance, containing at the base flint implements and the bones of extinct animals.

In the valley of the Rhine, lehm and moraines in the mountains.

Middle deposit, gravel composed of materials not derived from a great distance; anterior to the ancient glaciers.

Inferior deposit, gravel, rolled stones, exclusively from the rocks of Alpine origin, prior to the ancient glacier.

“ It results from this analogy that the remains of human industry in the valleys of the Somme, Seine, etc., correspond with the inferior diluvium of the valley of the Rhine, a deposit which is much anterior to the ancient glaciers of the Vosges, as it is separated from them by the middle diluvium of the Rhine, or the red diluvium of the valley of the Seine. Man has thus existed anterior to the ancient glaciers, and was the contemporary of the mammoth, etc., and other extinct animals, the remains of which are found associated with human implements. I have selected for comparison the ancient glaciers of the Vosges, as their relations with the dépôts of the plain of Alsace seem clear and decided. It may, perhaps, be premature to apply the same reasoning to the ancient glaciers of the Alps, since it is not proved that they have disappeared at the same time. They may have persisted for thousands of years after the fusion of those of the Vosges, they may also have originated thousands of years before those of the Vosges, on account of the orographic difference of the two regions.

M. Gaudin says:* “ On the contemporaneous vegetation of primitive man, M. Collomb admits that man existed before the glacial period. M. Lartet sustains that the greater portion of the existing

* “ On the Contemporaneous Vegetation of the Primitive Man.” Letter by C. I. N. Gaudin to Professor Alph. de Candolle; *Bibliothèque Univ.*, vol. viii, 1860.

animal population of our continent has passed through all the phases of the quaternary period.

"On a *resumé* as regards the terrestrial fauna, we arrive at the following conclusions:

"1. Some genera of mammals are no longer found in Europe, (Elephant, rhinoceros, hyæna, etc.).

"2. Certain species are entirely extinct. (*Elephas primigenius*, *Rhinoceros tichorhinus*, *Ursus spelæus*, etc.)

"3. Other species have continued to live in their respective regions, or in neighbouring countries. (*Ursus Arctos*, *Bos Urus*, *Cervus Tarandus*, etc.)

"Have the geological and climatic causes which produced these changes equally modified the flora which existed at the period when the great mammals became extinct? In other words, were the forests frequented by the men who fashioned the flints in France, England, etc., composed of the same species of trees which constitute the actual vegetation?

"The examination of the fossil impressions collected by Marquis Strozzi in the travertines of Tuscany prove that considerable modifications have been produced in vegetation. We may say that the changes in the flora and the fauna are parallel.

"1. Certain genera of plants which flourished in Europe at the period of the huge mammals are no longer indigenous in this part of the world. Such are the genera *Thuja*, *Liquidambar*, and *Juglans*.

"2. Some species are entirely extinct (*Thuja saviana*, *Juglans paviaefolia* Gaud.)

"3. Others exist still in Europe, near the beds where they have been found.

"Struck by this parallelism, I have long suspected that the modifications in the fauna and flora were effected at the same epoch.

"Very recently Mr. Penzi, of Rome, found in the travertines of Tivoli and Monticelli human teeth associated with the remains of the hyæna and other mammals. He considers this bed as belonging to the second pleistocene period, in the rocks of which near Rome large pachydermata have been found.

"In conclusion, the deposits of the travertines and tufas, characterized by their containing the bones of the large mammals contemporary with man, contain also a vegetation somewhat differing from that of our present forests.

"Some genera which then inhabited Europe are no longer met with, and these are chiefly American types, or those of the Atlantic islands."

"Some genera have completely disappeared from the surface of the globe, whilst the major part have not ceased to inhabit the same stations, or have migrated to neighbouring countries. The fossil animals which contain some leaves, prove that the deposits are either anterior or contemporaneous with the glacial period.

"I arrive thus as regards the vegetable world at the same conclusions as Lartet with respect to the animal world.

"The major portion of the vegetable population of our continent has traversed all the phases of the quaternary period, and that man could thus have existed as well as the vegetable world of our continent."

M. Gosse presented to the Anthropological Society of Paris seventy-one worked flints of various shapes. First a magnificent hatchet resembling those found by M. Boucher de Perthes, at Abbeville, but much larger, being not less than nineteen centimetres in length. To obviate any objection as to the nature and age of the bed, M. Gosse requested M. Hébert, Professor of Geology, to accompany him in his explorations of the quarry of the Rue de Grenelle. Professor Hébert states, positively, that the hatchet was extracted from the bed called the *inferior diluvium*, the thickness of which is about four feet and a half, situated about fifteen feet beneath the surface of the soil. It is noteworthy that scarcely any flints were found in the superior bed. In the same stratum were found a large number fossil bones, according to M. Lartet, the remains of the *Elephas primigenius*, *Bos primigenius*, the fossil horse, and a large carnivorous animal resembling the *cavern felis*. There were also extracted about seventy knives, wedges, arrowheads, etc. Some of the hatchets were only partially worked. The natural shapes of the flints appear to have been taken advantage of. There are at present about twelve gravel pits in Paris and its environs where flint implements are found.

Mr. Prestwich, in writing to M. Boucher de Perthes, says :*—"In writing to you a few days since, I forgot to state the opinion I have formed as regards the bed in which the flint hatchets are found.

"With regard to the workmanship of those you have shown to me, and which I have myself procured at Abbeville and Amiens, I have not the least doubt of their being worked by man.

"After having attentively examined the beds of Moulin Quignon, St. Gilles, Abbeville, Saint Acheul, and Amiens, I have the conviction that the opinion you advanced in 1847 in your work on Celtic and antediluvian antiquities, that these hatchets are situated in undisturbed ground associated with the bones of the large mammalia, is just and

* May 14th, 1859.

well founded. With regard to the bed at Menchecourt, the fact appears to me not so certain; yet I can detect no error.

"Permit me to observe that before my voyage I entertained the strongest doubts on the subject of the beds, and I am very happy to have convinced myself by searching for the truth of so important a fact."

In another letter to M. Boucher, dated June 8th, 1859, Mr. Prestwich writes:—"Though I returned fully convinced that the flint hatchets were truly from the diluvium, still I desired to find one myself, and that in the presence of other members of the Geological Society of London. I accordingly left ten days ago, accompanied by my friends, Messrs. Godwin-Austen, J. W. Flower, and R. W. Mylne. We went to work early the following morning, and after having closely examined the quarry at St. Acheul, Mr. Flower discovered and detached with his own hands, at a depth of twenty feet, a beautiful hatchet well worked, of the length of about twenty-five centimeters. It was found in an ochreous seam, beneath the white gravel, whence I extracted another hatchet. Above the gravel was a layer of sand with fresh water and land shells, then brown clay, gravel, and brick-earth. All was in the best order and undisturbed. It was beyond a doubt virgin soil. This discovery removed all doubts from the minds of my friends; and I believe we are all agreed as to the truth of which you have been the first exponent, and which you have vindicated for the last ten years, and of which I am happy to have been a witness."

Mr. Prestwich gives the following description of the gravel-beds of St. Acheul, capping a low chalk hill, a mile south-east of the city of Amiens, about one hundred feet above the level of the Somme, and not commanded by any higher ground. The following is the succession of the beds in descending order.

1. Brown brick-earth (many old tombs and some coins), with irregular bed of flint-gravel. No organic remains. Average thickness, ten to fifteen feet.

- 2 *a*. Whitish marl and sand, with small chalk debris. Land and fresh-water shells (all of recent species) are common, and mammalian bones and teeth are occasionally found. Average thickness, two to eight feet.

- 2 *b*. Coarse subangular flint gravel, white with irregular ochreous and ferruginous seams, with tertiary flint pebbles, and small sandstone blocks. Remains of shells, as above, in patches of sand. Teeth and bones of the elephant, and of a species of horse, ox, and deer,—generally near base. This bed is further remarkable for containing worked flints. Average thickness, six to twelve feet.

Mr. Prestwich, in his paper read before the Royal Society, May

26th, 1859, abstaining from all theoretical speculation, confines himself simply to the corroboration of the facts :—

1. That the flint implements are the work of man.
2. That they were found in undisturbed ground.
3. That they are associated with the remains of extinct mammalia.
4. That the period was a late geological one, and anterior to the surface assuming its present outline, so far as some of its minor features are concerned.

Lord Wrottesley writes :*—“ Another independent proof of the great age of the gravel on the banks of the Somme, is derived from the large deposit of peat, the oldest portion of which belongs to times far beyond those of tradition ; yet distinguished geologists are of opinion the growth of all the vegetable matter, and even the original scooping out of the hollows, are events long posterior in date to the gravel with flint implements, nay, posterior even to the formation of the layers of loam with freshwater shells overlying the gravel.”

Sir R. Murchison says :† “ Whilst the geological geographer who visits the banks of the Somme, and sees such an assemblage of relics beneath great accumulations formed by water (as I have recently witnessed myself), he is compelled to infer, when such a phenomenon was brought about, the waters, which have now diminished to an ordinary and small river, had risen in great inundations to the height of one hundred feet and more above the present stream, and swept over the slopes of the chalk in which the primeval inhabitants were fashioning their rude flint instruments, and when, as I would suggest, they escaped to the adjacent hills, and saving themselves from the sweeping flood, left no traces of their bones in the silt, sand, and gravel.”

Sir Charles Lyell says :‡ “ I am fully prepared to corroborate the conclusions which have been recently laid before the Royal Society by Mr. Prestwich, in regard to the age of the flint implements associated in undisturbed gravel, in the north of France, with the bones of elephants at Abbeville and Amiens. . . . I infer that a tribe of savages, to whom the use of iron was unknown, made a long sojourn in this region ; and I am reminded of a large Indian mound, which I saw at St. Simon's island in Georgia—a mound ten acres in area, and having an average height of five feet, chiefly composed of cast away oyster shells, throughout which arrow heads, stone axes, and Indian pottery are dispersed. If the neighbouring river, the Alatamaha, or the sea

* Lord Wrottesley in his Address at the Oxford Meeting of the British Association, 1860.

† Sir R. Murchison in his Address to the Geographical and Ethnological Section of the British Association at Oxford, 1860.

‡ Sir Charles Lyell's Address at the British Association, at Aberdeen, 1859.

which is at hand, should invade, sweep away, and stratify the contents of this mound, it might produce a very analogous accumulation of human implements, unmixed, perhaps, with human bones. . . . Lastly, the disappearance of the elephant, rhinoceros, and other genera of quadrupeds, implies in like manner a vast lapse of ages, separating the era in which the fossil implements were framed, and that of the invasion of Gaul by the Romans."

Assuming, now, that the worked flint theory is established by such strong evidence, as to amount to demonstration, there arise two very interesting questions: first, if possible, to determine the period in which these implements were fashioned, and the race of men who fabricated them.

It is not easy to give anything like a satisfactory answer to these queries, for in our present state of knowledge we possess no data to infer from. This much seems certain, that the race who worked the drift flints must have lived at a very remote time, cycles of ages anterior to the so-called Celtic period. Sir Charles Lyell* observes on this point. "All the evidence now before us on these flint implements, and on the circumstances under which they were found, would indicate that the people who made them must have occupied this site before the Straits of Dover were excavated."

It remains for geologists approximatively to determine the period when that event occurred.

M. George Pouchet † visited Saint Acheul, August 25, 1859. The workmen promised to call him as soon as they could find a "*langue de chat*," or cat's tongue, the name given by the miners to the flint hatchets. A few hours had scarcely elapsed when M. Pouchet was called for, and shown one; he, however, immediately perceived that it was a deception, and that the flint had been fraudulently introduced into an artificial cavity. After five days he was called again. This time he saw a hatchet imbedded in the diluvium under such conditions that a mystification was out of the question. After removing the flint from the diluvium he found that it had been worked, and must have been worked at a period anterior to the formation of the bed above it. Besides the stone hatchet which M. Pouchet had extracted himself, he saw many which had been dug out before his arrival. Some of these were spurious, others were perfectly genuine. Pouchet indicates an important character to distinguish the latter. In the course of centuries infiltrations reached the diluvium, depositing a crust of carbonate of lime, of about one millimetre in thickness,

* Opening Address, Aberdeen, 1859.

† Bulletin de la Société de la Anthropologie, November 3rd, 1859, p. 44.

upon the inferior surface of the flints in this bed. This crust is seen upon all the genuine hatchets at Saint Acheul, and is absent in the spurious hatchets fabricated by the miners. Some few of the genuine hatchets have, moreover, a characteristic peculiarity, that upon the surface, not covered by a calcareous deposit, dendritic impressions are seen, attesting the high, the great antiquity of the section.

Thus, continues M. Pouchet, the bed called diluvium contains, at Amiens, Abbeville, and in other spots of the basin of the Somme, objects worked by the hand of man, at a period long anterior to that usually assigned to man's apparition upon the earth. It has been pretended that the bed was not a real diluvium, but must have been formed since the commencement of the actual period. The fact, however, that in the same bed containing the hatchets, bones and teeth of the elephant, etc., have been found, proves, at any rate, that man inhabited the north of France simultaneously with the elephant. No human bones, it is true, have as yet been found. The remains of elephants have been, on account of their large dimensions, collected by the miners, while they carelessly cast aside the smaller bones. It is not known whether the diluvium of Saint Acheul does not contain human bones. M. Pouchet is convinced they will yet be found. This would complete the evidence, but is not absolutely requisite, as the existence of man is sufficiently attested by his works.

M. G. St. Hilaire said: I am not going to treat of the question of the "fossil man," but I believe that the question will soon be answered in the affirmative. There are already a sufficient number of facts which would be considered as conclusive, were the question confined to any other animal. Human bones have certainly been found in such positions, and with such characters, that no one would have thought to deny their being real fossils if they had belonged to the elephant or ox. But as the question related to man, and was an opposition to an idea accredited in science, many have tortured themselves to find sufficient reasons for rejecting them; and various hypotheses, some the most improbable, have to explain the intrusion of human bones in fossiliferous caverns and strata.*

As to the race who fabricated the flints, all opinions are simply the wildest conjectures; some think that the Iberians, who have been supplanted and nearly destroyed by the invading Celts, were the fabricators, whilst others attribute the implements to an extinct primitive race who are supposed to have lived long before the diluvial beds were formed—an inferior race, the relics of which, found by Professor Spring, in Belgium, he describes as follows.

* Société d'Anthropologie.

Cranium very small absolutely; very small also when compared with the large development of the jaws; forehead receding, temples flattened, nostrils large, dental arches very voluminous, supporting oblique teeth; facial angle about 70 degrees. The bones of the limbs short, indicating a stature not quite as high as that of the Lapps. And here it may be mentioned that while crania presenting the African type, have been found in various parts of the Continent, as in Baden; those found on the borders of the Danube and the Rhine, approach the shape of the crania of the Caribs.

The skulls found at Krems, in Austria, and at Lahr, in the valley of the Rhine, in the marl of the old alluvium, are also described as resembling those of the Caribs and Chilenos.

Surprising facts give rise to still more surprising theories; we are, then, by no means astonished that to explain the presence of these skulls, it has been broadly stated that the skulls belonged to natives of America, who had been brought to Europe and presented to the Spanish and German courts after the Conquest of the New World. How these skulls became mingled with the bones of the extinct animals is, however, left to the imagination.

Dr. Schmerling* found in several caverns on the banks of the Meuse, especially in the caverns of Engis and Engihoul, a quantity of human fossils, associated with the bones of extinct animals, and worked flints. Some of the crania approach the African type. He expresses his conviction that these crania belonged to individuals whose intellectual capacities were little developed. The colour, the degree of decomposition of the human bones is not in any way different from those of other animals; he concludes that the human remains have been buried in these caverns at the same epoch as the remains of extinct animals. What struck him most was the presence of flints of variable size, the forms of which were so regular that it is impossible to confound them with those found usually in the chalk. It cannot but be admitted that these flints were worked by the hand of man and may have served as arrows or knives. He attaches immense importance to the presence of these flints, for even if no human bones had been found in conditions favourable to the opinion that they belong to the antediluvian period the proof would have been furnished by the fashioned flint. He concludes, by expressing his conviction, that time will decide whether he is right to express himself in such a categorical manner.

De Sauley, the celebrated French antiquary and traveller, has given a description of the remarkable brick-soil of Marsal, in Lorraine,

* *Recherches sur les Ossements Fossiles*, Liège, 1846.

which was once inhabited by a pre-Celtic race. The valley, *de la Seille*, appears to have been originally a large marsh, perfectly unfit for human habitation. An unknown tribe of immigrants seem, for some reasons, to have selected this enclosed valley for a settlement. They consequently softened the clay of the surrounding hills, shaped it into lumps, burned them, and sunk millions of these bricks into the marsh, until the soil became sufficiently firm, not merely to bear their habitations, but the present towns—Dieuze, Marsal, etc., which now occupy the locality. This subterraneous work is called the *briquetage de Marsal*. It has been calculated that 4000 workmen, labouring eight hours daily, would require twenty-five years merely to prepare the bricks for burning. How long it took that primitive people to perform the task, is not easy to say.

Primitive Inhabitants of the North of Europe.—The supposition of pre-Celtic populations of Europe gains daily more ground. Professor Nilsson, of Lund, is of opinion that the southern parts of Sweden were formerly connected with Denmark and Germany. As vegetation increased, graminivorous animals came from the south; these were followed by carnivora, and finally, by man, who was contemporary with the primeval ox (*Bos primigenius*), and the cave bear. He adduces, as a proof, that they possess in Lund, a skeleton of the primitive ox pierced by an arrow, and another of a bear found under a gravel deposit, along with stone and bone implements, for hunting and fishing.

The skulls of this primitive race are short, and present the brachycephalic form of Retzius. The parietal tubers are prominent, and the occiput broad and flattened. This race seems to have been succeeded by another with a cranium of a more lengthened oval form, and a prominent and narrow occiput (Dolichocephalic of Retzius). The third race, with a longer cranium than that of the second, and marked by greater prominence at the sides, is, by Nilsson, considered to have been of Celtic origin, who have introduced the use of bronze. Finally, there came the true Swea, introducing weapons of iron, from which the present Scandinavians are descended. The settlement of this race occurred sometime in the sixth century.

The skull, which was found in 1857, in the gorge of the Neanderthal, between Düsseldorf and Elberfeld, has excited much attention amongst anatomists. No satisfactory proof of its geological antiquity has been afforded us, as it was only found in a cave about sixty feet above the stream of the Düssel, with a fissure partially filled with mud and stones, extending from the cave to the upper surface of the country, and through which the skeleton was probably washed. The loam in

which it was found, on the base of the cave, was five feet thick. The cranium exhibits many remarkable analogies to that of the chimpanzee, and has been stated by Professor Huxley to be the most ape-like skull he ever beheld. According to Professor Huxley, it resembles those of the apes, not only in the prodigious development of the superciliary prominences and the forward extension of the orbits, but still more in the depressed form of the brain-case, in the straightness of "the squamosal suture, and in the complete retreat of the occiput forward and upward, from the superior occipital ridges." The capacity of the skull was equal to the mean deduced from the comparison of the highest and the lowest human skulls. Professor Huxley, calling attention to the amount of variation between the skulls of the Australian race, warns cautious reasoners not rashly to affirm that the Neanderthal and Engis skulls were necessarily of distinct races. At the same time, he does not affirm that the Engis and Neanderthal skulls belong to the Australian race, or that the ancient skulls belong to one and the same race.

Professor Waitz, of Marburg, has in his latest work,* the following observations in relation to the antiquity of man.

"The exact period of man's appearance on the globe cannot be determined, but that it must be very remote from the adopted historical human period is for many reasons all but certain."

"Geology may, perhaps, furnish us some data. Thus, the age of the coal formation is by some computed to lie between five and nine millions of years. This calculation by no means appears to be exaggerated. Lyell, on the other hand, has calculated that the formation of the valley of the Niagara, which is much more recent than the diluvial deposits, required at least 35,000 years for its formation.

"Now, though it may be admitted that it has not as yet been proved that the age of man reaches much beyond the diluvial formation, there is still less reason to believe that he appeared later, inasmuch as no general change of the surface of the earth has since taken place, and as all the essential conditions for man's existence were then present. It seems, therefore, that we are justified to assume the age of man to be between the extreme limits of 35,000 and 9,000,000 years."

"It must be acknowledged, that the Professor, by thus soaring into infinite time far beyond our ken, takes rather the safe side of the question. At any rate, he seems merely to say that there is presumptive geological evidence that humanity is not younger than 35,000 years.

Primitive Inhabitants of the British Isles.—The ancient inhabitants of Britain seem to have been closely connected with those of Scandina-

* *Anthropologie der Naturvölker*, 1860.

avia. Dr. Wilde* thinks that there is sufficient evidence to believe that Ireland has at different and remote periods been inhabited by at least two if not three distinct races, the first of which was characterised by a short and the second by an elongated form of skull, corresponding in character and succession to the Aborigines of Scandinavia. Dr. Daniel Wilson, in his work,† is of opinion that the most ancient of the extinct pre-celtic races of Scotland were men with boat-shaped kumbecephalic skulls, the second race of Nilsson. These lived in the stone period. The short-heads lived after them; both were destroyed or displaced by the Celts in the bronze period; and, in their turn, gave way to the Norwegians, who introduced iron.

Intelligence of Primitive Races.—That the mere rudeness of workmanship in the implements left us by the antehistoric or aboriginal peoples, does not necessarily lead to the inference that they were physically and morally inferior to succeeding races, must be admitted, for it may be doubted, that supposing a number of the present intelligent audience were suddenly cast away upon some desert island, deprived of the least use of metal or of the means to procure it, whether they could, by mere percussion, and friction, manufacture objects either more perfect, or more adapted to the purpose intended than the rude implements of the antehistoric race. As, therefore, we cannot judge of them by their works, we must search for other indications of their supposed mental capacities.

It is generally admitted that the mental superiority of man depends on the development and structure of his brain, and that the manifestation of intellect and the capacity for improvement is closely connected with the cerebral structure. It is also mostly allowed that examination of the interior of the skull gives a fair index of the size and shape of the brain.

Hence, our chief anthropologists have adopted the particular shape of the cranium as the great mark of distinction between the different races of man.

Premature as the inference may be, still if we are to judge of the smallness of the skull, the development of the jaws, and other abnormalities of the crania, found mingled with fossil-bones and flint implements, the conclusion is not altogether unfounded that the original races were inferior to the succeeding immigrants, and also that the primitive race is now extinct in Europe, and has shared the fate of the gigantic animals with which it was contemporaneous.

* *Ethnology of the Ancient Irish.*

+ *Pre-Celtic Annals of Scotland.*